

REMARKS:

This paper is for submission of preliminary amendments and remarks for entry and consideration, and is responsive in any other manner indicated below.

Claims 1-2, 5-6, 8-11, 13-18, 21-22, 24-27, 31-34, 37-38, 40-43, 47-49 have now been amended and new claims 50-62 added. Applicants submit that the claims as amended and new claims include no new matter.

Entry of the preliminary amendments and examination of the application is respectfully requested. To the extent necessary, Applicants petition for an extension of time under 37 CFR §1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees and excess claim fees, to Deposit Account No. 01-2135 (referencing case No. 219.40430X00) and please credit any excess fees to such deposit account.

Respectfully submitted,

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APPENDIX - VERSION WITH MARKINGS TO SHOW CHANGES MADE IN THE
CLAIMS

Please amend claims 1-2, 5-6, 8-11, 13-18, 21-22, 24-27, 31-34, 37-38, 40-43, 47-49, and add new claims 50-62 as follows. Note that the full text of all claims (including those not being amended within this paper) may also be included to provide the convenience of a complete set of claims for easy review:

1. (amended) An Integrated Heat Spreader / Integrated Stiffener (IHS/IS) mountable to provide stiffening support to a substrate.
2. (amended) An IHS/IS as claimed in claim 1, [arranged] mountable to provide stiffening support to one of a thin-core and coreless substrate of [a ceramic, flex, and] an integrated circuit printed circuit board (IC-PCB) carrier package.
3. An IHS/IS as claimed in claim 2, the package being one of a pinned grid array (PGA), and a ball grid array (BGA) carrier package.
4. An IHS/IS as claimed in claim 2, the package being one of a flip chip pin grid array (FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.
5. (amended) An IHS/IS as claimed in claim 1, the IHS/IS substantially made of a thermally conductive material [, formed as] in a form of one of a molded, stamped,

etched, extruded and deposited IHS/IS, and is capable of withstanding temperatures of at least normal IC operation.

6. (amended) An IHS/IS as claimed in claim 1, the IHS/IS having an integrated stiffener extension which is substantially planar [stiffener] for mounting to a substantially planar die-side surface of the substrate.

7. An IHS/IS as claimed in claim 1, the IHS/IS having an internal cavity therein to provide clearance for at least one of a die, underfill, and die side component (DSC).

8. (amended) An IHS/IS as claimed in claim 1, the IHS/IS [being attached in] having separate multiple attachment parts.

9. (amended) An IHS/IS as claimed in claim 1, having [an] a mountable above-substrate cavity-height [when mounted,] which is one of equal to, and greater than, an above-substrate height, of a mounted IC-die.

10. (amended) An IHS/IS as claimed in claim 1, the IHS/IS having a mountable bottom surface [when mounted,] which is substantially co-planar with [, when mounted,] a top surface of a combination of an IC-die with interface material.

11. (amended) An IHS/IS as claimed in claim 1, the IHS/IS being [adapted] mountable to support a heat sink.

12. An IHS/IS as claimed in claim 1, the IHS/IS having an integrated cooling structure.

13. (amended) An IHS/IS as claimed in claim 1, the IHS/IS being electrically [connected] connectable to the substrate.

14. (amended) An IHS/IS as claimed in claim 1, the IHS/IS being electrically [insulated] insulatable from the substrate.

15. (amended) An IHS/IS as claimed in claim 1, the integrated stiffener portion being an edge/ring stiffener [for mounting] mountable to minor-planar side surfaces of the substrate.

16. (amended) An IHS/IS as claimed in claim 1, the integrated stiffener portion being an edge/ring stiffener having a non-flat cross section [adapted to mate] mateable with side surfaces of the substrate.

17. (amended) An IHS/IS as claimed in claim 1, the integrated stiffener portion being an edge/ring stiffener where portion of the edge/ring stiffener is [adapted to be pre-attached] preattachable to the substrate [by an carrier package manufacturer].

18. (amended) A carrier package comprising:

one of a thin-core and coreless substrate of [one of a ceramic, a flex, and] an IC-PCB; and

an IHS/IS [arranged] mounted to provide stiffening support [mounted] to said substrate.

19. A carrier package as claimed in claim 18, the package being one of a pinned grid array (PGA), and a ball grid array (BGA) carrier package.

20. A carrier package as claimed in claim 18, the package being one of a flip chip pin grid array (FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.

21. (amended) A carrier package as claimed in claim 18, the IHS/IS substantially made of a thermally conductive material [, formed as] in a form of one of a molded, stamped, etched, extruded and deposited IHS/IS, and is capable of withstanding temperatures of at least normal IC operation.

22. (amended) A carrier package as claimed in claim 18, the IHS/IS having an integrated stiffener extension which is substantially planar [for mounting] and mounted to a substantially planar die-side surface of the substrate.

23. A carrier package as claimed in claim 18, the IHS/IS having an internal cavity therein to provide clearance for at least one of a die, underfill, and die side component (DSC).

24. (amended) A carrier package as claimed in claim 18, the IHS/IS [being] is attached [in] as multiple parts.

25. (amended) A carrier package as claimed in claim 18, the IHS/IS having an above-substrate cavity height [when mounted,] which is one of equal to, and greater than, an above-substrate plane-height [, when mounted] of an IC-die.

26. (amended) A carrier package as claimed in claim 18, the IHS/IS having a bottom surface [when mounted,] which is substantially co-planar with [, when mounted,] a top surface of a combination of an IC-die with interface material.

27. (amended) A carrier package as claimed in claim 18, the IHS/IS [being adapted] having a support portion to support a heat sink.

28. A carrier package as claimed in claim 18, the IHS/IS having an integrated cooling structure.

29. A carrier package as claimed in claim 18, the IHS/IS being electrically connected to the substrate.

30. A carrier package as claimed in claim 18, the IHS/IS being electrically insulated from the substrate.

31. (amended) A carrier package as claimed in claim 18, the IHS/IS having [integrated stiffener portion being] an edge/ring stiffener [for mounting] mounted to minor-planar side surfaces of the substrate.

32. (amended) A carrier package as claimed in claim 18, the IHS/IS having [integrated stiffener portion being] an edge/ring stiffener having a non-flat cross section, [adapted to mate] mated with side surfaces of the substrate.

33. (amended) A carrier package as claimed in claim 18, the IHS/IS having [integrated stiffener portion being] an edge/ring stiffener where portion of the edge/ring stiffener is [adapted to be] pre-attached to the substrate [by a carrier package manufacturer].

34. (amended) A packaged integrated circuit (IC) comprising:
[one of a ceramic, flex, and] an IC-PCB carrier package including one of a thin-core and coreless substrate; and
an IHS/IS [arranged] mounted to provide stiffening support [mounted] to said substrate.

35. A packaged IC as claimed in claim 34, the carrier package being one of a pin grid array (PGA), and a ball grid array (FC-BGA) carrier package.

36. A packaged IC as claimed in claim 34, the carrier package being one of a flip chip pin grid array (FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.

37. (amended) A packaged IC as claimed in claim 34, where the IHS/IS is substantially made of a thermally conductive material [, formed as] in a form of one of a molded, stamped, etched, extruded and deposited IHS/IS, and is capable of withstanding temperatures of at least normal IC operation.

38. (amended) A packaged IC as claimed in claim 34, the IHS/IS having an integrated stiffener [extensions] extension which is substantially planar [for mounting] and mounted to a substantially planar die-side major planar surface of the substrate.

39. A packaged IC as claimed in claim 34, the IHS/IS having an internal cavity therein to provide clearance for at least one of a die, underfill, die-side component (DSC).

40. (amended) A packaged IC as claimed in claim 34, the IHS/IS [being attached in] having multiple attached parts.

41. (amended) A packaged IC as claimed in claim 34, the IHS/IS having an above-substrate cavity-height [when mounted,] which is one of equal to, and greater than, an above-substrate height[,] of a mounted IC-die.

42. (amended) A packaged IC as claimed in claim 34, the IHS/IS having a bottom surface [when mounted,] which is substantially co-planar with [, when mounted,] a top surface of a combination of an IC-die with interface material.

43. (amended) A packaged IC as claimed in claim 34, the IHS/IS [being adapted] having a support portion to support a heat sink.

44. A packaged IC as claimed in claim 34, the IHS/IS having an integrated cooling structure.

45. A packaged IC as claimed in claim 34, the IHS/IS being electrically connected to the substrate.

46. A packaged IC as claimed in claim 34, the IHS/IS being electrically insulated from the substrate.

47. (amended) A packaged IC as claimed in claim 34, the IHS/IS [with integrated stiffener portion] being an edge/ring stiffener [for mounting] mounted to minor-planar side surfaces of the substrate.

48. (amended) A packaged IC as claimed in claim 34, the IHS/IS [with integrated stiffener portion] being an edge/ring stiffener having a non-flat cross section [adapted to mate] mated with side surfaces of the substrate.

49. (amended) A packaged IC as claimed in claim 34, the IHS/IS Stiffener [with the integrated stiffener portion] being an edge/ring stiffener where at least a portion of the edge stiffener is [adapted to be] pre-attached to the substrate [by an IC-PCB carrier package manufacturer].

50. (new) A heat spreader/stiffener device comprising a thermally conductive member having a stiffener portion mountable to one of a thin-core and coreless substrate so as to increase a stiffness thereof, the heat spreader/stiffener device having a thermal path thermally connectable to the substrate.

51. (new) A heat spreader/stiffener device as claimed in claim 50, a stiffener extension bottom surface being substantially planar to facilitate mounting to a substantially planar die-side surface of the substrate.

52. (new) A heat spreader/stiffener as claimed in claim 50, the heat spreader/stiffener having a hollow frame shape to allow clearance for other components on the substrate.

53. (new) A heat spreader/ stiffener as claimed in claim 50, the heat spreader/stiffener mountable to support a heat sink.

54. (new) A heat spreader/stiffener as claimed in claim 50, the stiffener portion being an edge/ring stiffener extension mountable to minor planar side-surfaces of the substrate.

55. (new) An integrated circuit (IC) carrier package comprising:
an IC;
at least one of a thin-core and coreless substrate; and
a heat spreader/stiffener device with a thermally conductive member having a stiffener portion mounted to the substrate so as to increase the substrate stiffness, the heat spreader/stiffener device having a thermal path thermally connected to the substrate.

56. (new) An IC carrier package as claimed in claim 55, the carrier package being one of a pinned grid array (PGA) carrier package and a ball grid array (BGA) carrier package.

57. (new) An IC carrier package as claimed in claim 55, a stiffener extension bottom surface substantially planar and mounted to a substantially planar die-side surface of the substrate.

58. (new) An IC carrier package as claimed in claim 55, the heat spreader/stiffener device having a hollow frame shape to allow clearance for other components on the substrate.

59. (new) A carrier package as claimed in claim 55, the heat spreader/stiffener having a portion to support a heat sink.

60. (new) A carrier package as claimed in claim 55, the stiffener portion being an edge/ring stiffener extension mounted to minor planar side-surfaces of the substrate.

61. (new) An electronic system comprising:
an IC carrier package including an IC;
at least one of a thin-core and coreless substrate; and
a heat spreader/stiffener device with a thermally conductive member having a stiffener portion mounted to the substrate so as to increase the substrate stiffness, the heat spreader/stiffener device having a thermal path thermally connected to the substrate.

62. (new) An electronic system as claimed in claim 61, the IC carrier package being one of a pinned grid array (PGA) carrier package and a ball grid array (BGA) carrier package.